

Exploring the Co-existence of Industries and Local Communities in Environmentally Degraded Areas: The Case of the Asopos River

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Abstract

Economic activities of industries are often very important for the local communities in which they are established. Local enterprises can significantly contribute to the increase of employment level and the economic development of local communities. However, the establishment of industries may be accompanied with environmental degradation with significant environmental, social and economic impacts. In the present paper, we will explore the co-existence of industries with local communities in the area of the Asopos river in Voiotia, Greece. In particular, we present the results of an empirical research which was implemented in local communities in the wider areas of the Asopos river during Summer 2014. The aim of the research was to: a) record perceptions of citizens for the level of environmental quality in their area, b) to evaluate perceptions on the importance of different dimensions of sustainability for the economic development of the area. In the conclusions of the paper, we highlight the need to implement a bottom up integration of socio-economic dimensions of sustainability in environmental policies in order to increase environmental quality in the area while securing socio-economic well-being of local communities. These types of actions are crucial taking also into consideration the impact of the economic recession that Greece currently faces.

Keywords: industries; sustainability indicators; Asopos river; economic development

JEL Κωδικοί: Q53; Q56; Q58

1. Introduction

Sustainability has become a fundamental term in the context of public environmental policies in the past decades. This is mainly because nowadays it is widely accepted the public policies should be developed in accordance with the main principles of sustainable development: that is the creation of appropriate policies promoting economic development, while securing a good environmental quality and social justice for future generations (Grunewald and Bastian, 2014; Dibie, 2014).

The concept of sustainability is increasingly important especially in the case of areas which face environmental degradation due to industrial activities (Chapin *et al.*, 2009; Folke *et al.*, 2005; Sueyoshi and Goto, 2014). This is because it is often the case that the level of economic development in a specific area is dependent from the functioning of the same entity (industry) that causes environmental degradation. Thus, local communities are faced with a paradox. This paper aims to examine this situation focusing on how local communities co-exist with industries causing environmental degradation. A main question that we aim to explore is how local communities understand and perceive the role of local enterprises for environmental degradation and how these findings can be incorporated in public policies which are based on the main principles of sustainable development. We will explore these issues by focusing on the area of Asopos River in Greece, which faces environmental degradation during in the past decades.

2. Exploring the co-existence of local communities with local-enterprises.

According to Brundtland Commission (1987) “Our Common Future”, Sustainable development refers to *the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (Our Common Future, 1987). Based on this term, the level of sustainability in a specific area, especially when it faces environmental degradation, is directly related to multiple types of externalities and environmental disruptions, such as industrial pollution (Huppel and Simonis, 2009; Sueyoshi and Goto, 2014). People who live in environmentally degraded areas are often exposed to a wide array of environmental pollutants, through air, water and food. In this term, policy processes have to deal with diffuse impacts and complexities at the systemic level of society and among different actors and sectors (Kemp *et al.*, 2005; Boz and El-adaway, 2014). Due to this fact, it is essential to take into consideration local communities’ perceptions for the role of the industries in their area and then to find ways to involve them in decision-making processes.

Within the above, from the public perspective, the last decades a steady rise is observed asking local enterprises and industries to be transparent about their environmental, social and governance performance. Various studies have underlined that the type and the level of distribution of enterprises in a local area define the spatial extent of their impact (Condrad, 2008; Hendryx, 2008). It should be notes at this point that communities do not always react to environmental change in the same way. It is important to explore if their reaction promotes the main sustainability principles (Nelson *et al.*, 2007; Ramirez-Andreotta *et al.*, 2014). Understanding community perceptions toward local enterprises is a critical factor for successful citizen involvement and empowerment, so as to be considered more effectively in the long term the environmental, economic and social impacts caused by pollution stressors (Kirkpatrick *et al.*, 2014). Furthermore, such perceptions arise mainly from the interplay between socio-economic benefits and environmental risks (Hadden, 1991). Other studies highlight that perceptions are affected by local enterprisers function and are influenced mainly from the social, cultural, financial and political factors characterizing the life of a community (Sjoberg, 2000; Chauvin *et al.*, 2007).

Studies have shown that residents of industrial areas who are aware of pollution issues do not necessarily act in order to protest for the specific problem in their area. Nevertheless, regions that are in a close proximity to high pollutant enterprises and have been experiencing multiple environmental, social and political problems, can only tackle these issues through a collaborative and integrated approach (Esteves and Vanclay, 2009). Through a collaborative and integrated approach, social impacts are seen in relation to environmental stressors. Factors such as the type of participation process, collaboration techniques and other various levels of social and scientific knowledge, are significant in framing and analyzing residents perception for pollution and enterprises activities in environmentally degraded regions (Glucker *et al.*, 2013; Mahoney *et al.*, 2007; Innes and Booher, 2014).

Taking into consideration the importance of citizens' perceptions in environmentally degraded areas; we present in the next sections the results of a study which was conducted in Greece, in an area which faces significant environmental problems due to the functioning of high pollutant industries.

3. Methods

3.1 Description of the Research Area

The Asopos River runs through the regions of Viotia and Attiki in Greece. In total the river has a length of 57 km. The river starts near the village of Lefktra and ends in the coastal area near Xalkoutsis and Oropos. During its flow, the river goes through the area of Oinofita where several industries have been established in the past 50 years. The area has faced environmental degradation for several decades. In 1969, a ministerial decision permitted industries established in the area to deposit their waste in the Asopos River (Linos *et al.*, 2011). Furthermore, in the regions of Viotia and Attiki, the number of industries increased significantly since 1984 (Tentes *et al.*, 2009), and the creation of an industrial zone was permitted in the Oinofita region. Today, almost 700 industries function in the area. In this way, Asopos river started to receive large amounts of untreated industrial waste (Loizidou, 2009; Giannouloupoulos, 2008) while very few environmental monitoring systems existed in the area. Although, there are several studies which focus on the environmental impact from the functioning of the industries in the area (Loizidou, 2009; Giannouloupoulos, 2008), few studies have explored the socio-economic impacts resulting from environmental degradation issues. In this context, we decided to explore social factors which are mainly linked with environmental degradation and focus on the understanding on how local communities co-exist with local enterprises and industries.

3.2 Research Design and implementation

An empirical study was conducted through the distribution of a structured questionnaire in all the communities which are near to the Asopos river in the regions of Viotia and Attiki. According to the data from Hellenic Statistical Authority the total population of these communities is approximately 30,000. Through the questionnaire, we explored among other topics, citizens' perceptions on the environmental degradation in the area, the contribution of local enterprises in local communities and potential links of local enterprises with communities.

In order to minimize sampling error we decided to approach a sample of 1000 individuals in the area through face-to-face interviews. The number of participants from each community was determined based on the population of the community. For selecting an adequate sample size from the (finite) population of the region we have used the simple random sampling (SRS) technique that allows drawing valid conclusions about the entire population of the

region based on the selected sample. Particularly, for selecting the sample size of the finite population (n_{finite}) of a total size of $N \approx 30,000$ population, we have utilized the following formula:

$$n_{finite} = \frac{N \cdot n}{N + n - 1} \quad \text{where} \quad n = \frac{t^2 \hat{p}(1 - \hat{p})}{e^2}. \quad (1)$$

In the latter formulas

$$\hat{p} = \frac{\sum_{i=1}^n (p_i)}{n} \quad (2)$$

denotes the estimate of population proportion that share a certain characteristic on one of the dichotomous variables in the survey. With (e) we denote the proportion of error we are willing to accept between the sampling proportion and the unknown proportion of the population (we chose $e=3\%$). (For a confidence level of 95% it is $t=1.96$). In addition, according to a pilot survey of 50 questionnaires the higher proportion value is $p=0.50$, and the required total sample size n is thus determined to be approximately $n_{finite}=1000$. The present analysis is therefore based on a sample frame of approximately 1000 individuals in the area interviewed through face-to-face interviews. This was done due to the absence of lists with the total population and also to ensure that specific groups were included in the sample which was important for our research (farmers, free-lancers). Thus, the demographics of the sample were checked in relation to the demographics of the actual population. Face to face interviews were conducted by six experienced researchers during the summer 2014. The response rate was around 80%. In parallel with the face to face interviews, 500 questionnaires were also left in specific households selected randomly in order to be returned with a pre-paid envelope. The response rate of the main survey was approximately 10%. In total 858 questionnaires were collected from both types of surveys. Data have been analyzed through SPSS. The main characteristic of the sample are presented in Table 1.

Table 1. Demographic Characteristics of the sample

Sample characteristics		%
Gender	Male	68.6
	Female	31.4
Educational level	Up to 6 years	14.8
	9 years	11.6
	12 years (secondary education)	32
	15 years (post secondary)	14.8
	Higher education	23.5
	Post-graduate studies	3.1
Income level	No income	25.6
	Up to 12,000	46.3
	12.0001-30,000	23.5
	300001-60000	2.9
	Over 60,000	1.7
Age	(mean)	46.7
Years living in the area	(mean)	32.4

4. Results

4.1 Perception for the Environmental Quality Levels in the area

A first issue investigated was the perceptions of citizens on the problem of environmental quality. 74.2% of the participants mentioned that they regard that there is a problem in their area. Those respondents who replied positively in this first question, they were then asked to evaluate the severity of the problem on a 5 point Likert scale with 5 representing very severe. The mean score for the total sample was 4.57 (st.dev.=0.84) revealing that these citizens consider the problem as very important. All participants were then asked to evaluate the level of environmental quality in their area for different environmental aspects. These questions were measured on a 5 point Likert scale with 5 representing the best environmental quality. Regarding the level of environmental quality in their area in general, respondent's answers gave a mean of 3.30. When exploring more specific environmental problems, 'air quality' was considered as the least important problem (3.64) followed by 'soil quality' (3.41) and 'biodiversity' (3.20). The lowest mean (most important environmental problem) was observed for the 'quality of drinking water' (3.05).

4.2 Perceptions on the contribution of local enterprises

A second issue explored was how individuals perceive the impact of local enterprises for their community. Several potential impacts were presented to respondents and they were asked to declare if they regarded that local enterprises had a positive, negative or no impact. The most positive impact was observed for the level of 'employment' in the area (49.9%). This means that almost half of the sample regarded that local enterprises assist in the reduction of unemployment in their community. It should be noted that according to a different question of the study, 34.3% of the participants mentioned that they had worked in a local business in the past 5 years. The second most important positive impact was the 'increase of agricultural production' (49.4%). Regarding the 'exchange of knowledge' (mainly on technological issues) to the local community, 48.6% of respondents considered that no activities were done by enterprises in order to exchange this knowledge. Concerning the level of 'contribution to social and cultural event', 42.1% mentioned that there is a positive impact, while 36.4% that there was no impact. Furthermore, a positive impact on the 'purchase of local products' was mentioned by 49.4% of the sample and 44.7% regarded that there is a positive impact from industries on the 'quality of life'. In all of the above impacts the positive impacts had higher percentages than the negative ones. Only in two cases more participants considered that the impacts were more negative than positive. These were the impacts on 'health issues' and 'environmental issues' where 31% and 34.3% respectively considered that local enterprises had a negative impact. However, it should be noted that 42.9% and 37.2% of respondents regarded that local industries did not have an impact on health and environmental issues respectively.

4.3. Activities implemented from local enterprises benefiting local communities

A final issue explored through the study concerned the 'social profile' of local enterprises. Taking into consideration the environmental impact that some of them have in their area, we thought it would be interesting to check if these enterprises do some activities which assist local communities. This question is also linked to the potential implementation of Corporate Social Responsibility activities in the area. From the results of the study it became evident that apart from socio-cultural events (mainly traditional festivals, festivals for promoting agricultural products- food and wine- and music events) other activities are very weakly developed. In particular socio-cultural events were mentioned by 44.7% of

respondents (Table 2) followed by financial (mainly financial aid to local municipalities for the construction of buildings for educational and athletic events) and humanitarian events (mainly financial help and scholarships for educational enhancement of employees' children). The lowest level of activities was presented for events boosting the touristic profile of the area.

Table 2. Activities from local enterprises in the local communities

Activities for...	
Social/cultural events	44.7
Financial aid	27.4
Humanitarian events	27.1
Environmental protection events	24.3
Tourist activities	13.3
Educational activities	21.6

5. Discussion and Conclusions

In this paper some preliminary findings are presented concerning the co-existence of local communities with enterprises taking as a case study the area of the Asopos river in Greece. The investigation of the co-existence of communities with enterprises is very important topic taking into consideration that often local enterprises cause environmental degradation but at the same time provide local communities with significant benefits, such as increase in employment rates. One important issue that emerged from the study is that local enterprises seems to have a positive effect on employment levels, the production and promotion of local agricultural production and exchange of knowledge (mainly on technological issues). Also, social and cultural activities are also implemented by some local enterprises. However, it is clear from the responses of participants that health and environmental negative impacts are important.

Economic and social impacts based on the co-existence of local enterprises and municipalities around Asopos river, can be easily transformed into auxiliary factors that integrate regional economy into the local market. While it can strengthen democratic reforms and increase welfare conditions of local population (Glasson *et al.*, 2012). It is important for citizens to understand the risks and benefits associated with industrial co-existence so they can reach informed public decisions (Marara, 2011). Public concerns are sometimes ignored or downplayed by environmental policy makers, as they refer to complex risk perceptions (Hadden, 1991; Williams *et al.*, 1999; Badr *et al.*, 2011). During the policy formulation procedure, one possible challenge could be the differences in obtaining information and conducting research involving individuals, communities, stakeholders and policy makers (Glasson *et al.*, 2012; Badr *et al.*, 2011). Furthermore, policy formulation in this context can incorporate public participation and an extended social analysis into a policy design mainly focused on the positive impact maximizing social utility and development potential within a sustainability framework (Becker and Vanclay, 2003). In the policy implementation stage, it is equally important to involve all affected parties and stakeholders, by incorporating scientific and social knowledge, collecting data on attitudes and perceptions towards the coexistence with industries, in order to minimize potential conflicts (Cashmore *et al.*, 2013; Devine-Wright, 2005). In this context, building a strong political and policy platform and proving possibilities to create a link between local population and the industry, policy-makers and communities can secure the incorporation of sustainability principles on an

environmentally degraded region (Zah and Ruddy, 2009; Innes and Booher, 2014). In the case of the Asopos river this would mean that all local stakeholders should be invited in deliberation techniques in order to plan effective environmental policies in the area.

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